LESSON MAKER PRO

Zero Factor Lab

Factor quadratics to uncover their zeros.

HIGH SCHOOL · HSA-SSE.B.3a

CCSS.Math.Content.HSA-SSE.B.3a "Factor a quadratic expression to reveal the zeros of the function it defines."

NAME _____ DATE _____

FACTOR, THEN SET EQUAL TO ZERO

A zero is an x-value that makes a function equal 0. Factor the quadratic expression, set each factor equal to 0, and solve each short equation. If a product equals 0, at least one of its factors must equal 0.

WORKED EXAMPLE

Factor $f(x) = x^2 - 7x + 10$. Then find the zeros of f.

1. Find two numbers with a product of 10 and a sum of -7: -5 and -2.
2. Write the factors: $f(x) = (x - 5)(x - 2)$.
3. Set each factor equal to 0: $x - 5 = 0$ or $x - 2 = 0$.

Answer: f(x) = (x - 5)(x - 2); zeros: x = 5 and x = 2

PRACTICE 6 problems

1 Factor $g(x) = x^2 + 11x + 24$. Then find the zeros.

ANSWER _____

2 Factor $h(x) = x^2 - 13x + 36$. Then find the zeros.

ANSWER _____

3 Factor $p(x) = 2x^2 - 37x + 156$. Then find the zeros.

ANSWER _____

4 Factor $q(x) = x^2 - 121$. Then find the zeros.

ANSWER _____

5 Factor $r(x) = -3x^2 + 59x - 210$. Then find the zeros.

ANSWER _____

6 Factor $s(x) = x^2 + 32x + 256$. Then find the zero.

ANSWER _____

APPLY IT Show your work

1 A coding club models a simulated drone's height above the ground, in game units, with $h(x) = -x^2 + 21x + 100$, where x is time in seconds. Factor h(x) to find its zeros. Which zero shows when the drone reaches the ground after x = 0?

WORK SPACE

ANSWER _____

2 A student club starts with a $340 sponsor contribution for an event. Its remaining balance after x supply orders is modeled by $B(x) = -x^2 + 3x + 340$. Factor B(x) to find the zeros. What positive number of supply orders makes the balance $0?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Factor $6x^2 - x - 12$. Then explain how your factors show both zeros.

WORK SPACE AND ANSWER

ANSWER KEY

Zero Factor Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $g(x) = x^2 + 11x + 24$. Then find the zeros.	**g(x) = (x + 3)(x + 8); zeros: x = -3 and x = -8**
2	Factor $h(x) = x^2 - 13x + 36$. Then find the zeros.	**h(x) = (x - 4)(x - 9); zeros: x = 4 and x = 9**
3	Factor $p(x) = 2x^2 - 37x + 156$. Then find the zeros.	**p(x) = (2x - 13)(x - 12); zeros: x = 13/2 and x = 12**
4	Factor $q(x) = x^2 - 121$. Then find the zeros.	**q(x) = (x - 11)(x + 11); zeros: x = 11 and x = -11**
5	Factor $r(x) = -3x^2 + 59x - 210$. Then find the zeros.	**r(x) = (-3x + 14)(x - 15); zeros: x = 14/3 and x = 15**
6	Factor $s(x) = x^2 + 32x + 256$. Then find the zero.	**s(x) = (x + 16)(x + 16); zero: x = -16**

PART 2 · APPLY IT

1. **h(x) = -(x - 25)(x + 4); zeros: x = 25 and x = -4. The drone reaches the ground at 25 seconds.** Factor out -1, then factor $x^2 - 21x - 100$ as (x - 25)(x + 4). Time after x = 0 must be nonnegative, so use x = 25.
2. **B(x) = -(x - 20)(x + 17); zeros: x = 20 and x = -17. The balance is $0 after 20 supply orders.** Factor out -1, then factor $x^2 - 3x - 340$ as (x - 20)(x + 17). Only the positive zero has meaning for a number of supply orders.

CHALLENGE

$6x^2 - x - 12 = (3x + 4)(2x - 3)$. The product is 0 when 3x + 4 = 0 or 2x - 3 = 0, so the zeros are x = -4/3 and x = 3/2.

Accept factors in either order and equivalent factored forms with a common negative factor. For the word problems, accept both algebraic zeros, but the stated real-world answer must use the nonnegative zero.